amination and study of the case uninfluenced by any opinion expressed by the attending physician. When his study of the case has been completed and his conclusions have been reached, a written report should be made in triplicate—one copy furnished to the attending physician, one to the insurance carrier, and one to the Industrial Commission.

When a patient is discharged it is not only the right, but the duty of the Commission to see that the attending physician has been adequately compensated for the services rendered. Good pay insures good service.

HOW PHYSICIANS AND SURGEONS CAN AID THE COMMISSION

Physicians and surgeons are in a position to render very valuable service to the Industrial Commission in the following particulars:

1. They should report promptly and fully every industrial case. Detailed and careful examinations are not always made. Cases of serious fractures are at times overlooked for months. This is a strong statement, but it is a matter of record. The fact is a challenge to your profession.

2. A very careful record of the progress of the case should be kept and the information summarized in the form of supplemental reports as required by law. Your original report, properly signed by you, should be filed with the Industrial Commission within seven days of the time you first see the patient. You are not permitted to file your report with an insurance carrier or an employer and trust them to furnish the Commission with a copy. A copy from a third party, irrespective of his interest, is not your report to the Commission. Such procedure is contrary to law, and is punishable by a fine of not to exceed $500. Notwithstanding the persistence of this practice the Commission has never instituted a prosecution. You can help us much by compliance with the law.

3. You can be very helpful by forgetting all personal interest in your cases save superior service to your patients, carefully recorded histories, and the maintenance of high professional standards. Care should be taken never to appear as partisans in a contested case. Cases agitated by a physician who has a fee interest in their success are not as clear-cut as those in which personal interest is not apparent. It is doubtful if as great weight is given, or ought to be given, to the testimony of a physician who manifests a partisan bias influenced by interest. This applies with equal force to the testimony of those who have a professional fee in the offing, or who serve the employer or an insurance carrier, or any other interest, for a price.

4. You can be very helpful to the Commission when called upon to testify in a case if you will deal with admitted medical facts as much as possible and avoid the field of speculation. No professional man can possibly know all there is to know about his chosen profession. It therefore follows that a physician cannot know all about diagnoses. It ought not to humble the pride of a doctor in reply to a question to state that he does not know the answer. Many questions whose answers must be highly speculative, if not a downright guess, are leveled at you. It is refreshing in wading through a mass of medical testimony to occasionally have a doctor reply, "I don't know." There ought to be more of such testimony. We read many pages of medical testimony, the outstanding characteristic of which is a manifest lack of frankness.

In closing, permit me to say that I like doctors as a class. I have taken occasion to defend them on more than one occasion when attacked. At Atlanta, Georgia, four years ago, I gave expression to my own feelings as well as those of my colleagues in the following statement: "Physicians and surgeons, as a class, are as fine a group of men as it has ever been my privilege to meet, yet it must be kept in mind that it is impossible to find any professional group which will not have a few members to degrade it."

THE PROSTATECTOMY OPERATION: ITS EVOLUTION*

By VERNE C. HUNT, M. D.
Los Angeles

DISCUSSION *by Frank Hinman, M. D., San Francisco; Anders Peterson, M. D., Los Angeles.*

THE condition of prostatism has, no doubt, been experienced by the same percentage of elderly men since time immemorial, or at least since the time at which men lived sufficiently long to enter the so-called prostatic age. Ancient writers considered patients with prostatic hypertrophy and obstruction as suffering from excrescences or carnosities at the neck of the bladder, and when obstruction developed from such cause, interfering with emptying of the bladder, their destruction was attempted by urethral instrumentation. The cause of such obstruction was not known, for not until about the middle of the sixteenth century was the prostate gland (the discovery of which was attributed to Nicolo Ulassa, a Venetian physician) considered the cause of obstruction at the neck of the bladder. After the discovery of the prostate gland, and that with its enlargement obstruction of the vesical neck occurred, methods of treating prostatic obstruction up to the time of the strictly surgical era consisted for the most part of tunneling through the gland. This procedure was practiced by John Hunter, Chopart, Billroth, and others; though the danger was great and there were many fatalities. Very little progress was made in the treatment of prostatic obstruction during the time between the discovering of the prostate gland in about the middle of the sixteenth century until some time after the middle of the eighteenth century, when surgical procedures were instituted for removal of stones from the bladder. It is true that cystostomy had been accomplished

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many times before this time, chiefly through the perineum, as an emergency procedure for the removal of stone and, incidentally, portions of prostatic tissue. The names of Sir Henry Thompson, Gouley, Desault, Sir William Blizzard, Sir William Fergusson, Amussat, Guthrie, Mercier, and many others figure prominently in the evolution of the management of prostatic obstruction through the presurgical years and into the surgical era. Apparently the modern surgical procedures for removal of the prostate gland are the ultimate results of perineal lithotomy for stone. Perineal lithotomy was described in the medical treatises of the ancient Hindus. Through the centuries frequent reference is made to those who cut for stone. The Hippocratic oath contains the statement, "I will not cut persons laboring under the stone, but will leave this to be done by men who are practitioners of this work." Apparently the operation of cystostomy must have resulted from the procedures intended primarily for the removal of stone.

EARLY METHODS OF TREATING PROSTATIC OBSTRUCTION

Covillard in 1639 is said to have performed perineal prostatectomy, during which procedure tissue was removed from the bladder, which was said by Gouley to have been prostatic tissue. This successful procedure was apparently the incentive for similar operations in the seventeenth and eighteenth centuries. Desault and Sir William Blizzard carried out practically identical surgical procedures. The operation was subsequently done by Sir William Fergusson in 1848 (reported in 1870), Billroth in 1867, Spanton, and others. Gouley, in 1873, advocated complete perineal prostatectomy; however, this was not done until 1891 by Goodfellow. Part of the prostate gland was first removed in 1832 by Amussat during the course of suprapubic lithotomy.

Transurethral surgical procedures began to be developed at about this time. Guthrie, in 1834, divided the bar at the neck of the bladder by using a catheter carrying a concealed blade. Similar instruments invented by Mercier were called "prostatomes" and "prostatectomes."

Injection of various drugs in an effort to cause shrinkage of the prostate gland developed about 1874, when Heine injected iodin into the gland. Langenbeck and Iverson injected ergotin subcutaneously. The danger of suppuration which might result fatally prevented these procedures from being widely adopted.

The ingenuity that was exercised by those in the sixteenth to the early nineteenth century for the relief of obstruction at the neck of the bladder is most interesting. In general, however, it may be stated that direct surgical attack on the prostate gland was seldom attempted before the period of antiseptic surgery. When portions of prostate gland were removed it was only in the course, for the most part, of perineal or suprapubic incision for stone. The occasional surgical attack before this time was considered a most daring and courageous undertaking.

MODERN METHODS OF TREATING PROSTATIC OBSTRUCTION

Belfield must be considered one of the pioneers in modern surgery of the prostate gland. He summarized, in 1890, in his article, "Operations on the enlarged prostate," his information at that time with a compilation of the operations on the prostate gland that had been done up to that time in America and abroad.

The contributions of Lister mark the beginning of modern prostatic surgery. To quote from Belfield's personal communication under date of March 30, 1929: "It is to be recalled that suprapubic cystostomy for stone, discarded for centuries, was resurrected in the early eighties of the nineteenth century as one of many tentative beneficiaries of Listerian principles. For obvious reasons, so obvious that, according to one of his assistants, Lister never ventured to perform it, suprapubic cystostomy did not benefit through Listerism as did operations in clean flesh; stones were still extracted through perineal incisions, through which gravity furnish a cardinal element of Listerism, drainage. Yet the obvious mechanical advantages of the suprapubic incision inspired surgeons to devise means of protection against infection of the wound, including the prone position, the continuous bath, and the two-step incision—the first step exposing but not opening the bladder; the second step, five or more days later, opening the bladder." Belfield stated further in the personal communication: "In my earlier days I often made a prostatectomy in two stages: the first comprising an incision to the bladder plus a perineal boutonniere for the insertion of a large bladder drain; the second stage, opening the bladder and enucleating the prostate, a hand above, a finger below, with closure of the bladder." It was inevitable that the revival of suprapubic cystostomy for stone should allure venturesome surgeons to attempt more complete removal of prostatic obstructions under the eye. Belfield's table indicates that three men—von Dittel, Belfield, and McGill—reported such work within two years; Kümmel also operated in that period, but his publications did not appear until later.

Belfield was of the opinion that von Dittel was the first to attack the prostate gland from above by resecting a portion of a large middle lobe during the course of exploratory cystostomy, presumably for stones. Belfield believed, though, that he himself was the first to perform deliberately suprapubic cystostomy for the avowed and sole purpose of removing obstructing portions of the enlarged prostate gland. His cases reported in 1887 were the first recorded attacks on the prostate gland from above, with the sole exception of von Dittel's case. McGill of Leeds, accredited in Europe as a pioneer, performed his first operation and made his first publication in 1887. Belfield believed, and had no reason to doubt during his life, that the pioneers in suprapubic prostatectomy were von Dittel, Belfield, and McGill in the order named, stating that he

realized that priority in its performance is a matter of little moment to anyone except the pioneers themselves, and perhaps of little moment even to them beyond their consciousness of worthwhile achievement.

Belfield, in his article published in November 1890, reviewed the cases from the literature and from personal communication in which operations had been done on the prostate gland. In all, there were 133 cases. In forty-one of these cases the operation was by perineal incision with a mortality rate of 9.7 per cent; in eighty-eight cases operation was by suprapubic incision with a mortality rate of 13.6 per cent, and in four cases operation was by the combined suprapubic and perineal incisions. The perineal operations consisted of prostatectomy or incision of the bar at the neck of the bladder in twenty-two cases by Keyes, Harrison, Gouley, Belfield, Cabot, Watson, Chismore, Wishard, Hutchison and Briggs, and partial prostatectomy was done in nineteen cases by Ashhurst, Keyes, Harrison, Bryant, Coulson, Morton, Dunn, Pilcher, Gouley, Landerer, Billroth, and Frank. The suprapubic operations, likewise, consisted of partial prostatectomy with the removal in some instances of but small pieces of tissue. In this method of procedure the names of von Dittel, Belfield, Kümmel and McGill appear most prominently; McGill performed twenty of the eighty-eight suprapubic operations. Operations for prostatic obstruction at this period were done usually only when there was complete obstruction by prostatic enlargement or associated vesical calculus in which the catheter had been indispensable, and the results were determined in terms of whether or not there was restoration of voluntary urination after operation. In the cases reviewed by Belfield, voluntary urination resulted in 68 per cent of the patients after perineal operation and in the same per cent of the patients after suprapubic operation. Belfield's contribution in 1890 may well be used as an analysis of the status of prostatic surgery at that time.

THE PERINEAL OPERATION

Perineal prostatectomy has emanated from the operations of perineal lithotomy and subsequent perineal prostatectomy through its many phases of development until the modern perineal prostatectomy of Young may well be regarded as the most widely known and accurately developed perineal operation. It is probable that perineal prostatectomy preceded the suprapubic operation by several years. Deaver stated that it was employed first for malignant disease by Billroth in 1867, by Demarquay in 1873, by Langenbeck in 1876, by Spanton in 1882, and by Leisrink in 1883. The perineal approach to the prostate gland was early recommended by Harrison, Ashhurst, Annandale, Zuckerkandl, Watson, von Dittel, and many others; however, little progress was made in its development beyond the removal of parts of the gland until Goodfellow in 1891 performed perineal enucleation of the lateral lobes with removal of the median lobe. He stated at that time that so far as he knew he was the first deliberately to devise and to carry out perineal prostatectomy. Goodfellow in 1904 reported the results of such a procedure in seventy-two cases in which he had operated, with only two fatalities. Incontinence immediately, and often persisting for four months, was frequently noted.

Samuel Alexander in 1896 reported two cases in which he had done prostatectomy by the combined suprapubic and perineal incisions, enucleating the prostate gland through the latter. The opening in the bladder above was made simply for the purpose of pressing down the prostate gland with the finger so that it could be reached from the perineum. He stated that by this method the mucous membranes of the bladder and of the prostatic urethra remained uninjured. The bladder was drained through the membranous urethra and perineum. Nicoll of Glasgow in 1894 described a similar combined operation except that he did not open the urethra, but drained the bladder subsequently through the suprapubic incision.

Parker Syms in 1899 expressed the opinion that prostatectomy performed through the perineum and without opening the bladder suprapubically was safer than the procedures which involve suprapubic cystostomy. Murphy, Gouley, Guiteras, and others at about this time contributed instruments and modifications with the idea of simplifying the perineal procedure. Syms devised a balloon which when inflated in the bladder served as an excellent method for making traction on the prostate gland.

The perineal operations at this time were of two types, the distinction lying chiefly in whether or not the membranous urethra was opened; when the urethra was not opened it was called the extra-urethral perineal prostatectomy, which Guiteras described as the Zuckerkandl operation. When the urethra was opened the operation was called intra-urethral perineal prostatectomy. For the most part the operations through the perineum up to approximately the time that Young first described his method of perineal prostatectomy were much the same; they differed in the type of incision in the skin (whether it was a median incision as used by Syms and others, or whether it was a semicircular incision in front of the anus as accredited to the so-called Zuckerkandl operation); they differed also in whether the urethra was opened, in the methods of making traction on the gland by hooks and various retractors, and in making counterpressure suprapubically without incision or with incision to the bladder, or by suprapubic cystostomy. The perineal operations up to this time had been more or less blind procedures, and not until Proust presented his method had the procedure been conducted under the eye. Young in 1903 described his operation, which was a modification and combination of various features of the different perineal operations at that time. Young's first interest in the perineal operation was to improve methods of making traction on the prostate gland.

The result of his effort to improve on Syms' method of providing traction on the prostate gland was the metal double-bladed prostatic tractor which has become so well known. The operation which Young described at that time has endured in principle to the present time and has been modified in detail by him, and by Hinman, Geraghty, Lowsley, and others. Young's original operation was carefully illustrated and described in detail in the *Journal of the American Medical Association* in October 1903, and elsewhere, including Keen's Surgery.

Young at this time contributed an excellent prostatic tractor. He visualized the entire procedure of prostatectomy as an extra-urethral operation. He devised an operation for the preservation of the ejaculatory ducts, and in many instances executed the operation without injury to the mucous membrane overlying the enlarged prostate gland. At the time this operation was described and illustrated he had operated in fifteen cases by the method described, with recovery of all patients, with a good functional result in all and never more than temporary incontinence. From time to time, Young added improvements to the technique, which in the main have consisted of various types of capsular incisions which have facilitated enucleation of the gland, and the preservation of the verumontanum, ejaculatory ducts and urethra.

Many unfortunate sequelae subsequent to perineal prostatectomy were reported from time to time, most important of which were injury to the rectum, often resulting in recto-urethral fistula and urinary incontinence. Incomplete removal of all adenomatous tissue at times required postoperative use of the catheter. Young's contribution in 1903 accomplished much to obviate such sequelae. Inasmuch as his operation was not universally adopted, largely because of its difficulties and the requisite of accurate anatomic knowledge of the perineum, unfortunate sequelae still occurred. In his hands, the technique was productive of excellent results with little incontinence, and was accompanied by a low mortality rate.

Geraghty in 1922, for the purpose of insuring greater safety to the sphincters by Young's operation in general hands, presented "a new method of perineal prostatectomy which insures more perfect functional results." Geraghty's modification of Young's method was for the purpose of exposing the prostate gland without opening the membranous urethra and without injury to the external sphincter. A specially constructed tractor, devised by Henry Freiberg, was used which passed from the meatus into the bladder. This tractor, when the blades were opened, so engaged the prostate gland that perineal urethrotomy was not necessary to introduce a prostate tractor as used by Young, obviating the necessity of exposing, opening, or disturbing the membranous urethra and its musculature in the perineal dissection.

Hinman in 1926 presented certain modifications of Young's operation and stated that with these modifications the mortality rate was between two and three per cent, and of the patients who survived, approximately 95 per cent were cured of the urinary disturbance. Furthermore, persistent urethrorectal fistula, and incontinence as a result of the operation had not occurred in any case. The time of closure of the perineal fistula had been considerably shortened by the use, for a number of days after the operation, of a retained catheter, to which a Connell suction apparatus was attached to promote catheter drainage and to keep the perineum dry. He said that the technical modification which he presented rendered the operation easier and the results better, and had to do with the dissection method of exposure and the manner of opening the prostate gland for its enucleation.

In recent years Young, Wildbolz, and others have presented methods of restoring the continuity of the prostatic urethra by end-to-end suture when the prostatic urethra has been removed in the process of total enucleation of the enlarged glandular tissue. Various other factors in recent years, particularly the methods of hemostasis, notably the hemostatic bags, have contributed materially to the perfection of the perineal method of prostatectomy.

SUPRAPUBIC PROSTATECTOMY

The simplest method of affording lasting relief from urinary retention as the result of prostatic obstruction during the latter half of the nineteenth century was the formation of a permanent suprapubic fistula, often executed by puncture with a trocar or sometimes by cystostomy, a tube being more or less constantly worn.

John Packard in 1887 stated that Nicholas Franco of Lausanne was the first surgeon who opened the urinary bladder by an incision made above the pubis. His operation was performed in 1560 for the removal of a calculus, and although it was successful he is quoted as advising others not to follow his example. During the entire eighteenth century there was much difference of opinion regarding the choice of methods of draining for retention or operating for stone. The perineal method was most largely employed, but it is of interest that Packard quoted the opinions of men favoring the suprapubic method over the perineal. Among those favoring the suprapubic method were: John Hunter, Weldon, Dorsey, Decamp, Phillips, Amussat, Parrish, Gouley, and many others.

The perfection, by many methods, of the operation of suprapubic cystostomy for urinary retention and stone led to exploration of the bladder and removal of portions of prostatic tissue which consisted for the most part of intravesical enlargement, in the course usually of operations intended for the removal of stone in the bladder. As previously stated, von Dittel was the first to attack the prostate gland from above by resecting a portion of a large middle lobe, performing this operation in February 1885, with subsequent death of the patient. Belfield's and

McGill's work and publications followed in 1887 and 1888. Belfield subsequently experienced difficulty in removing intra-urethral prostatic enlargement for which he thought the perineal operation was highly effective, but inasmuch as the perineal operation failed in the detection and removal of intravesical enlargement, he suggested the combined suprapubic and perineal approach which seemed to him to fulfill every indication in every case.

To Fuller, it seems, belongs the credit for first accomplishing not only the removal of the intravesical enlargement of the prostate gland, but the intra-urethral prostatic enlargement as well by the process of suprapubic enucleation. This procedure was described by him in 1895 and was devised and practiced by him the previous year. He stated at that time that unsuccessful results of other surgeons by the suprapubic method were due to incomplete removal of the enlarged gland; the object of many surgeons had been simply to chisel out a channel or remove only intravesical tumors. Even though priority of the method of suprapubic enucleating belongs to Fuller, in which procedure he had a large and most gratifying experience, Freyer must be credited with popularizing the operation as previously described by Fuller and Guiteras.

It is worthy of notation here that in the latter part of the nineteenth century, until approximately 1900, the operations of castration and ligation of the internal iliacs had been extensively employed in the treatment of prostatic obstruction for the purpose of causing atrophy of the gland through absence of testicular influence on the prostate gland after castration, and the loss of blood supply through ligation of the iliacs. These procedures rapidly became obsolete through failure of the former to produce the desired effects, except in a few instances, and the great risk in the latter procedure.

It may be stated that even though Freyer seldom mentioned Fuller or Guiteras and failed to credit them with priority of suprapubic enucleation, he must be credited with calling the profession back to the rational treatment of enlargement of the prostate gland after it had digressed by resuming the nibbling operation, and that of castration plus ligation of the iliac vessels. Also, his numerous literary contributions with detailed reports of cases and the rapidity with which the operation was executed, the low mortality rate, and excellent results, unquestionably elevated the standard of prostatic surgery and popularized the suprapubic method of enucleation.

By this time, radical cure of prostatic obstruction and urinary retention by prostatectomy had become accepted as the rational method of treatment. However, controversy persisted over the choice of suprapubic and perineal methods with the general acceptance that all cases could not be most effectively treated by simply one or the other method. Chute in 1905 showed that the chief advantage in the perineal operation existed in its lower mortality rate which was slightly less than that of the suprapubic operation. The perineal operation persisted as the one of choice, as shown by the figures of Watson and of Proust in which the incidence of the suprapubic operation to the perineal operation was about 1:3. Young, Cabot, Whiteside, Escat, Proust, Moynihan, Albarran, Deffis, Tuffier, Hartman, Pouchet, Roffin, Deaver, Fergusson, Legueu, Rivier, Heresco, and many others contributed during the first decade of the present century to the standardization of methods and analyzed results obtained by the various methods.

J. Bentley Squier in 1911 presented a radical departure from the methods previously used by Fuller, Freyer, and others in the accomplishment of total suprapubic prostatectomy. He emphasized the advisability of making the incision in the bladder large enough to admit two or three fingers, and as high up on the fundus of the bladder as possible, close to the peritoneal reflexion, calling attention to the fact that the situation of the incision in the bladder had much to do with the length of time required for healing of the suprapubic sinus.

During this period it may be stated that much was being learned regarding the effect on the patient of prostatic obstruction and the causes of death following prostatectomy. It had been noted, as Paul M. Pilcher stated, that death without good explanation occasionally occurred in some cases in which the good general appearance of the patient lured the surgeon into a state of false security, and this led to the general opinion of that day that more preoperative information was in order to obviate the continued occurrence of death among apparently good surgical risks. This author, among others, recognized the necessity for thorough preoperative examination, utilizing the conservative methods of overcoming urinary obstruction by intermittent urethral catheter, or, if need be, by suprapubic cystostomy under local anesthesia. Young was one of the first to observe the benefits derived from preliminary drainage of the bladder. In 1899, in a patient in whom there was deep uremic coma and a hugely distended bladder, catheterization was attempted without success and suprapubic drainage was carried out. Young witnessed the amazing disappearance of coma, and restoration of an apparently normal condition as a result of drainage. One month later Young carried out his first suprapubic prostatectomy, removing a huge prostate gland successfully through the previous cystostomy incision. The case was the first recorded two-stage suprapubic prostatectomy. Young appreciated the benefits to be derived during the period of drainage by catheter or cystostomy, from the administration of large quantities of water, and the publication of his observations in three cases furnished the groundwork for the method of preparatory treatment, which has since been carried out and to the perfection of which there have been innumerable contributions. That

preliminary-drainage was necessary and extremely advantageous in many cases of prostatic obstruction, particularly those in which the obstruction had been of long standing, was generally accepted. There was much conjecture and little true understanding of the factors involved whereby improvement occurred subsequent to drainage until renal functional tests made their appearance and the relationship of blood chemistry to certain types of disease became manifest. Cabot presented a paper in 1916 in which he considered "the mechanism of the protection afforded by the drainage of prostatics as a preliminary to operation." During the first ten years of this century, at least the necessity of drainage was recognized and as a result of inability to accomplish urethral catheterization cystostomy often became the necessity, if not the choice, of methods of drainage. The great improvement that was noted after drainage naturally led to the adoption of the two-stage prostatectomy, which, when necessary, has for the most part been confined to the suprapubic operation on the grounds that as long as the cystostomy opening is present for drainage, it may be readily utilized for the second stage or enucleation of the gland. The advantages of two-stage suprapubic prostatectomy were apparent to most surgeons, and these were presented by Judd, Lewis, Paul M. Pilcher, Lilienthal, Gardner, Chute, Legueu, and many others.

A noteworthy observation of a student of the evolution of the various procedures well into the second decade of this century is that, developmentally at least, the suprapubic procedure lagged considerably behind the perineal operation. That an anatomic and pathologic background existed for each method there was little question. Accuracy of execution of perineal prostatectomy was first achieved by Young when he brought the entire operative procedure of perineal enucleation into view. It will be recalled that all of the descriptions of the pioneers of suprapubic prostatectomy, from the nibbling operations of the late eighties and nineties, including practically all of Freyer's work, were operations conducted blindly and under the guidance of the finger. The suprapubic operation lacked the accuracy of conduct possessed by the perineal method through failure of surgeons to allow light to enter the bladder suprapubically.

The suprapubic incision, for the most part and by most surgeons, was a small one, including that of the skin and muscles and the bladder itself. Judd was one of the first, in 1911, to present a method of more liberal suprapubic incision of the abdominal wall and of the bladder, with the subsequent aid of retractors in the bladder to visualize the procedure in the one-stage operations to remove more certainly all adenomas, prostatic tags and other tissues which might subsequently be responsible for stricture, and to control active bleeding. J. W. Thomson-Walker, Lower, McCarthy, and others have contributed to the development of the one-stage visualized suprapubic prostatectomy.

In most of the operations of prostatectomy the principle of suprapubic drainage has been maintained; details as regards the number and size of drainage tubes have differed. As the visualized method became one of choice among a number of surgeons, one of suggested change was that of Lower, who suggested the omission of suprapubic drainage, and accomplishment of suprapubic prostatectomy with closure. Lower maintained that operation for removal of the prostate gland which required drainage was not ideal, but he had previously considered drainage necessary because it was the general practice and also because of postoperative oozing which nearly always occurred. He felt sure that if a method could be devised whereby hemorrhage could be controlled completely, there could be no objection to closing the bladder primarily and depending on an inlying catheter for urinary drainage. To this end he adopted a method whereby the bleeding is controlled by suture, which procedure he described and illustrated in 1927, at which time he had employed the method in a series of fifty cases, in most of which the bladder had been closed at the time of operation.

Simultaneous with the work done by Lower in perfecting a method of prostatectomy with closure, Harris of Sydney was perfecting a method of suprapubic prostatectomy with closure which differed materially from the method of Lower. This procedure has been carefully described and illustrated elsewhere. As yet, these methods of prostatectomy with complete closure have not been enthusiastically adopted; however, the exponents of these methods predict greater usage of the method with increasing experience in their execution.

It may be stated that the previously existing controversy over the choice of operation and the advantages and disadvantages of the perineal and suprapubic procedures, one over the other, has arrived at a most amicable compromising position in that the surgeon who is best fitted in prostatic surgery is he who is familiar and equally proficient in the execution of either method, choosing the operation which best suits the condition, rather than fitting the patient to the operation. It is likewise recognized that best results will be obtained by one or the other method in accordance with the training and experience of the surgeon in one or the other operation.

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DISCUSSION

FRANK HINMAN, M. D. (384 Post Street, San Francisco).—The history of the development of methods of prostatectomy has been presented in a very complete and interesting manner. Only two routes stand out as worthy of consideration: The suprapubic transvesical approach after the method of Fuller-Freyer, and its subsequent modifications; and the perineal approach on the principles of anatomical dissection as first presented by Young with its subsequent modifications of manner of enucleation, closure and drainage. But there have been many other routes used for the removal of enlarged prostate and it may be of interest to present these more or less diagrammatically:

METHODS OF PROSTATECTOMY

A. Urethral methods. (Chips from hyperplastic projections into vesical neck and prostatic urethra. Palliative and require repetition.)
   1. "Incisor" procedures.
      (a) Bottini's "incisor."
      (b) Collins' "knife."
      (c) Freudenburg's "lithotriptor."
   2. "Forage."
      (a) Luy's principle of fulguration and diathermy.
   3. "Punch" procedures in modification of Young's principle for median bars.
      (a) Caulk's cautery punch.
      (b) Day's transfixation coagulation punch.

B. Surgical methods. (Attempt at radical and permanent cure.)
   I. Suprapubic approach:
      1. *Transvesical: Fuller-Freyer method and modications* of suture and closure. (Squier, Judd-Hunt, Lower-Harris.)
      2. Extravesical through space of Retzius (Von Stockem).
   II. Infrapubic by division of suspensory ligament of the penis.
   III. Perineal:
      1. Median transurethral methods (Goodfellow, Alexander, Berndt, Marion Syms).
      2. Lateral approach of Willms.
      3. Anatomical conservation by surgical dissection of perineum.
         (a) Proust.
         (b) Zuckerkandl.
         (c) *Young's operation and modifications.*
            (1) Geraghty.
            (2) Wildbolz.
            (3) *Transprostatic* en masse enucleation, urethral catheter drainage and suture closure without packs giving obliteration of fossa and hemostasis, with *low mortality, safe, speedy convalescence, good structural and functional results.*
            (4) Complete extracapsular prostatoseminal vesiculectomy for cases of pure hyperplasia with pronounced infection and vesiculitis.
   IV. Ischiorectal method of Voelcker.
   V. Transrectal method (used by the late Doctor Clark of Gilroy, Calif.). (Unpublished.)

It is seen by the above analysis of methods that development has been along two distinct routes—the suprapubic transvesical Fuller-Freyer route, and the perineal conservative Young route.

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ANDERS PETERSON, M. D. (1136 West Sixth Street, Los Angeles).—Doctor Hunt has given us a very complete history of the operation of prostatectomy.

Some time ago the American Urological Association made plans to have a number of the most qualified members write a complete history of the development of urology. The men were chosen to write upon the subject in which they were most eminently interested. Doctor Hunt's paper this afternoon deals only with the operation of prostatectomy; but, as I have had an opportunity to read the entire monogram, I can appreciate the large amount of time which he has devoted to the entire field of prostatic surgery.

All of these contributions are to be put in book form, which should remain for all time a most valuable reference for both students and practitioners.

THE LURE OF MEDICAL HISTORY

ESSAYS ON THE HISTORY OF EMBRYOLOGY*

THE FOUNDATIONS OF MORPHOLOGIC EMBRYOLOGY

III

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ONLY a few things on generation deserving of mention are known to have appeared during the long span of years between Galen and the seventeenth century—a period of about fifteen hundred years.

LEONARDO DA VINCI, 1452-1519

Since such a genius as Leonardo da Vinci belongs in this period, one is prompted to inquire regarding his ideas concerning generation. Although Leonardo's interest in anatomy was artistic rather than scientific, a man of such great accomplishments cannot be overlooked. His anatomical drawings attest to his surpassing skill even if they do not have great scientific value and seem to have been largely without influence on the course of anatomy. McMurrich's careful study clearly shows that Leonardo, like Galen, fell into errors because he transferred anatomical arrangements found in other mammals to man himself. Although he must have been familiar with the discoidal placenta, he nevertheless represented a full-term human fetus in an opened uterus, accompanied by an ungulate placenta. According to McMurrich the allantois accompanying the figure of a child is spoken of as passing "between the hands and knees of the child as it lies curled up, and it passes between the arms and the inner (*silvestra*) part of the thigh as far as the flanks and ties and encloses, making itself an investment for the child from its flanks downward." He also spoke of a male and a female portion of the cotyledons and wondered which was expelled at birth.

Leonardo seems to have accepted traditional views, and when he departed from these his conceptions really do not represent an advance. Since the mother breathes for the child, he argued that the maternal heart also beats for the fetal heart and that the latter remains motionless until birth. He believed in maternal impressions and stated that the soul of the mother forms the fetus, the two having but one soul. He thought that the maternal emotional states not only may mark, but may kill the fetus. Like many others he bowed to religious authority in this connection, saying that he leaves to them "the rest of the definition of the soul," since they know all secrets by inspiration.

Leonardo's statement that although the fetal kidneys function, no urine is expelled because the

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